



E103-W05B User Manual

W600 2.4GHz SMD Low-cost Long-distance external-antenna Wifi-Module



CONTENTS

Chapter 1 Overview.....	3
1.1 Introduction.....	3
1.2 Features.....	3
1.3 Application scenarios.....	3
Chapter 2 Specifications.....	5
2.1 Limit parameters.....	5
2.2 Operating parameter.....	5
Chapter 3 Size and pin definition.....	6
Chapter 4 Basic Operation.....	7
4.1 Hardware design.....	7
4.2 Software writing.....	8
Chapter 5 Basic Application.....	9
5.1 Basic circuit.....	9
5.2 Basic usage.....	9
Chapter 6 Frequently Asked Questions.....	10
6.1 The transmission distance is not ideal.....	10
6.2 Module is easy to damage.....	10
6.3 Matters needing attention.....	10
Chapter 7 Welding Operation Guidance.....	12
7.1 Reflow temperature.....	12
7.2 Reflow profile.....	13
Chapter 8 Related Models.....	13
Chapter 10 Antenna Guide.....	14
9.1 Recommendation of Antenna.....	14
9.2Antenna selection.....	14
Revision history.....	15
About us.....	15



Chapter 1 Overview

1.1 Introduction

E103-W05B is a SMD module under the E103-W05 series (for the convenience of the following description, collectively referred to as E103-W05 or W05 below), this module product is a low-cost, cost-effective 100mW (20dBm) wifi digital transmission Module, small in size, onboard IPEX antenna interface, working in the 2.4~2.483GHz frequency band, low power consumption, fast data stream transmission, the module can use serial port for data transmission and reception and AT command related parameter setting, secondly, E103-W05 AT command Most of them are compatible with E103-W01 modules, making it easy to use and quick to get started, both for old and new users, and are a good data transmission partner in the Internet of Things.

The E103-W05 module is developed by Chengdu Ebyte Electronic Technology Co., Ltd. based on the W600 chip of Lianshengde. The module integrates transparent transmission function, ready to use, supports serial AT command set, server AT command set, users can use the network access function through the serial port, and is widely used in smart home appliances, smart homes, wireless audio and video, smart toys, IoT application fields such as medical monitoring and industrial control.



1.2 Features

- Support boot transparent transmission, automatic connection when disconnected;
- Multiple baud rates;
- SmartConfig configuration function;
- Support TCPServer, TCPClient, UDP;
- Three working modes: STATION, AP, STATION&AP;
- 14mA low-power data reception;
- Support serial transparent transmission;
- Multiple encryption methods;
- Support module serial port AT command configuration;
- Built-in watchdog, never crash;
- Parameter memory, save when power off.

1.3 Application scenarios

- Wireless meter reading;
- Wireless sensing;
- Smart home;
- Industrial remote control and telemetry;
- Smart buildings and smart buildings;

- High-voltage line detection;
- Environmental engineering;
- Highway;
- Small weather station;
- Automatic data collection;
- Consumer electronics;
- Intelligent robot;
- Street light control.

Chapter 2 Specifications

2.1 Limit parameters

Main parameters	Performance		Remark
	Min	Max	
Power supply voltage (V)	3.0	3.6	Over 3.6V will permanently burn the module
Blocking power (dBm)	-	20	It is less likely to burn when used at close range
Working temperature (°C)	-40	+85	Industrial grade

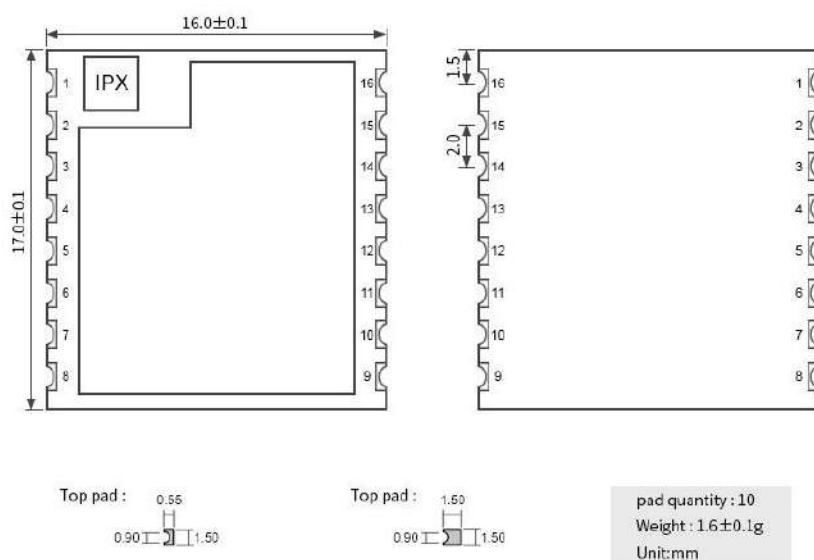
2.2 Operating parameter

Main parameter		Performance			备注
		Min	Type	Max	
Operating voltage (V)		3.0	3.3	3.6	≥3.3V can guarantee output power
Communication level (V)		-	3.3	3.6	It is recommended that the difference between the supply voltage and the supply voltage is less than 0.3V to reduce power consumption
Operating temperature (°C)		-40	-	+85	Industrial design
Operating frequency (Mhz)		2400	-	2484	802.11 b/g/n
Power consumption	Emission current (mA)	-	230	-	Instantaneous power consumption
	Receiving current (mA)	-	95	-	-
	Sleep current (μA)	-	5.0	-	-
Maximum transmit power (dBm)		-	-	20.00	802.11 b 信道 11
Receiving sensitivity (dBm)		-	-89	-	OFDM, 6 Mbps
Communication rate	Network (bps)	1.0M	-	54.0M	802.11 b/g/n
	Serial port (bps)	600	-	2.0M	programmable custom User zation

Main parameter	Description	Remark
Reference distance	400m	Clear and open, external antenna, antenna gain 5dBi, omnidirectional antenna; height 2.5 meters
Operating frequency	80MHz	-
Modulation	-	DSSS(DBPSK,DQPSK,CCK),OFDM(BPSK,QPSK,16QAM,64QAM)
Package	Stamp hole	-

Communication Interface	Serial port	600bps~2Mbps
Dimensions	17*16*2.5mm (± 0.2)	PCB onboard antenna + Stamp hole
RF interface	IPEX	External antenna
weight	7.79 $\pm$ 0.1	Unit: g

Chapter 3 Size and pin definition



No.	Pin item	Direction	Application
1	RST	I	Hardware reset pin, low level reset
2	NC	IO	Floating, GPIO14 of the internal chip can be used as input and output pins
3	NC	I	Floating, WAKE pin of internal chip, high level wake up
4	NC	IO	Floating, GPIO15 of the internal chip can be used as input and output pins
5	NC	IO	Floating, GPIO16 of the internal chip can be used as input and output pins
6	NC	IO	Floating, GPIO17 of the internal chip can be used as input and output pins
7	NC	IO	Floating, GPIO18 of the internal chip can be used as input and output pins
8	VCC	P	Power supply, range 3.0~3.6V (standard 3.3V)

9	GND	P	Ground wire, connected to the power reference ground
10	NC	IO	Floating, GPIO6 of the internal chip can be used as input and output pins
11	NC	IO	Floating, GPIO7 of the internal chip can be used as an input and output pin
12	NC	IO	Floating, GPIO8 of the internal chip can be used as input and output pins
13	NC	IO	Floating, GPIO9 of the internal chip can be used as input and output pins
14	NC	IO	Floating, GPIO10 of the internal chip can be used as input and output pins
15	RXD	I	Serial port receiving pin, support AT command
16	TXD	O	Serial port sending pin, support AT command
Note: I:input; O:output; P:power supply			

Chapter 4 Basic Operation

4.1 Hardware design

- It is recommended to use a DC stabilized power supply to supply power to the module. The power supply ripple coefficient is as small as possible, and the module needs to be grounded reliably;
- Please pay attention to the correct connection of the positive and negative poles of the power supply. Reverse connection may cause permanent damage to the module;
- Please check the power supply to ensure that it is within the recommended power supply voltage. If it exceeds the maximum value, it will cause permanent damage to the module;
- Please check the stability of the power supply, and the voltage should not fluctuate greatly and frequently;
- When designing the power supply circuit for the module, it is often recommended to reserve more than 30% of the margin, and the whole machine is conducive to long-term stable operation;
- The module should be as far away as possible from the power supply, transformer, high-frequency wiring and other parts with large electromagnetic interference;
- High-frequency digital wiring, high-frequency analog wiring, and power wiring must avoid the bottom of the module. If it is necessary to pass under the module, assume that the module is soldered to the Top Layer, and the top layer of the contact part of the module is covered with copper (all copper And well grounded), it must be close to the digital part of the module and routed in the Bottom Layer;
- Assuming that the module is soldered or placed on the Top Layer, it is also wrong to randomly route the wires on

the Bottom Layer or other layers, which will affect the stray and receiving sensitivity of the module to varying degrees;

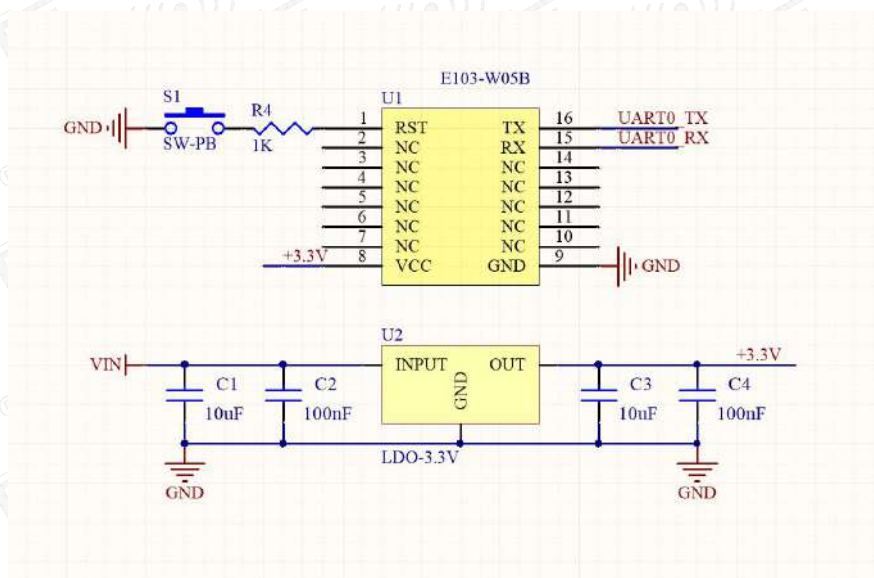
- Assuming that there are devices with large electromagnetic interference around the module, it will greatly affect the performance of the module. According to the intensity of the interference, it is recommended to stay away from the module. If the situation permits, proper isolation and shielding can be done;
- Assuming that there are traces with large electromagnetic interference around the module (high-frequency digital, high-frequency analog, power wiring), it will also greatly affect the performance of the module. According to the intensity of the interference, it is recommended to stay away from the module. Isolation and shielding;

4.2 Software writing

- The module chip solution is Winner Micro W600, and its driving method is completely equivalent to W600, and users can operate according to the W600 chip book;
- The GPIO port of the internal chip is a general I/O port, which can be controlled by related AT commands;

Chapter 5 Basic Application

5.1 Basic circuit



5.2 Basic usage

No.	How to use	Descriptions
0	Module to module communication	Module 1 is set to AP mode and establishes a TCP or UDP server, module 2 is set to STATION mode and connected to AP 1, and communicates with module 1 through TCP or UDP Client
1	Module and Server communication	The Wi-Fi module is connected to the network through a wireless router, and communicates with a server on the network (LAN or Internet) through TCP Client or UDP.
2	Module and Client communication	If you need to connect to the Internet server, you need to configure the corresponding port mapping on the router.

Chapter 6 Frequently Asked Questions

6.1 The transmission distance is not ideal

- When there is a straight line communication obstacle, the communication distance will be attenuated accordingly;
- Temperature, humidity, and co-frequency interference will increase the communication packet loss rate;
- The ground absorbs and reflects radio waves, and the test effect is poor near the ground;
- Sea water has a strong ability to absorb radio waves, so the seaside test effect is poor;
- If there are metal objects near the antenna or placed in a metal shell, the signal attenuation will be very serious;
- The low voltage of the power supply at room temperature is lower than the recommended value, the lower the voltage, the lower the power output;
- The poor matching degree of the antenna and the module or the quality of the antenna itself.

6.2 Module is easy to damage

- Please check the power supply to ensure that it is within the recommended power supply voltage. If it exceeds the maximum value, it will cause permanent damage to the module;
- Please check the stability of the power supply, and the voltage cannot fluctuate significantly and frequently;
- Please ensure that the installation and use process is anti-static, and high-frequency components are electrostatically sensitive;
- Please ensure that the humidity should not be too high during installation and use, and some components are humidity sensitive devices;
- If there is no special requirement, it is not recommended to use at too high or too low temperature.

6.3 Matters needing attention

6.3.1 The relationship between AP&STA&Server&Client

In the above two network access examples in Sections 6.2 and 6.3, it is not only in AP mode that TCP Server can be established. Similarly, it is not only when the module is in STA mode that TCP Client can be established. AP and STA are just modules that access the network. A working mode of the TCP Server, TCP Client and UDP can create network links in any mode of the module.

6.3.2 Note for transparent transmission

The transparent transmission mode can only be used when the module is working in TCP Client and UDP. TCP Server cannot enter the transparent transmission mode. After entering the power-on transparent transmission, you

must remember to manually activate the transparent transmission with AT+CIPSEND. If the user wants to boot For transparent transmission, you need to make relevant settings in the following interface.



6.3.2 The maximum number of connections between AP and server

When establishing TCP Server and TCP Client, pay attention to the option of opening and closing multiple connections;

When the module is used as an AP, it can be connected by at most 5 STAs. When the module is working in TCP Server mode, it can be connected by at most 5 TCP Clients. Therefore, it is recommended for customers to use short packet data or without considering packet loss. UDP carries out relevant communication.

6.3.2 AT commands

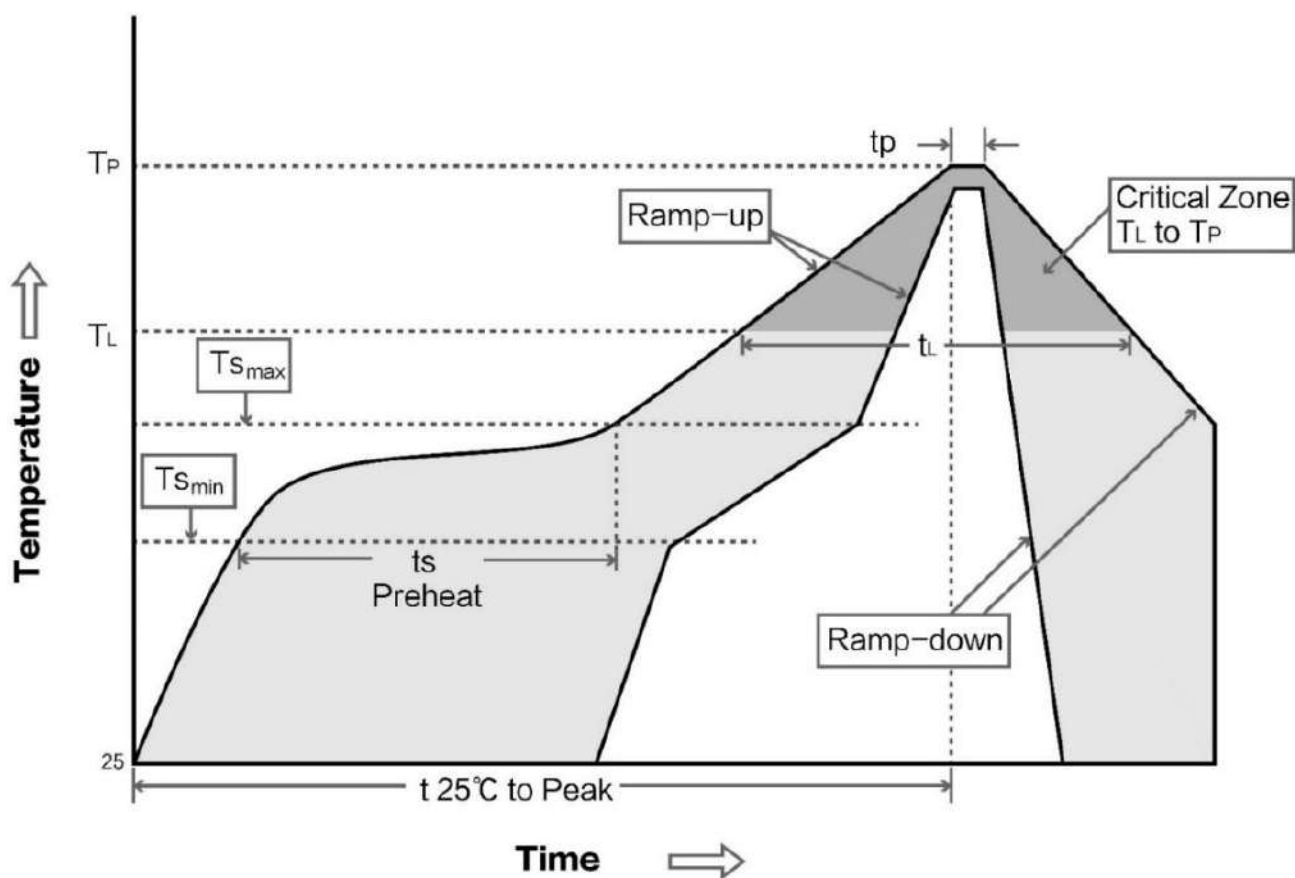
The AT commands used by E103-W05 series sub-modules (E103-W05A, E103-W05B, E103-W05C) can be used mutually, but users must make relevant settings according to the electrical characteristics of their own modules. In addition, due to different electrical characteristics, E103-W05 series modules are not fully compatible with the AT commands of E103-W01. Therefore, some AT commands applicable to E103-W01 are not fully applicable to E103-W05. For the detailed AT command set, please refer to the manual "E103-W05 AT Commands" Collection Guide.

Chapter 7 Welding Operation Guidance

7.1 Reflow temperature

Profile Feature	Curve characteristics	Sn-Pb Assembly	Pb-Free Assembly
Solder Paste	Solder paste	Sn63/Pb37	Sn96.5/Ag3/Cu0.5
Preheat Temperature min (T _{smin})	Min preheating temp.	100°C	150°C
Preheat temperature max (T _{smax})	Max preheating temp.	150°C	200°C
Preheat Time (T _{smin} to T _{smax})(ts)	Preheating time	60-120 sec	60-120 sec
Average ramp-up rate(T _{smax} to T _p)	Average ramp-up rate	3°C/second max	3°C/second max
Liquidous Temperature (TL)	Liquid phase temp	183°C	217°C
Time (t _L) Maintained Above (TL)	Time below liquid phase line	60-90 sec	30-90 sec
Peak temperature (T _p)	Peak temp	220-235°C	230-250°C
Average ramp-down rate (T _p to T _{smax})	Average ramp-down rate	6°C/second max	6°C/second max
Time 25°C to peak temperature	Time to peak temperature for 25°C	6 minutes max	8 minutes max

7.2 Reflow profile



Chapter 8 Related Models

Model	IC	Antenna type	Distance	Product Size	Package	Interface	Features/Remark
			m	mm			
E103-W05	W600	PCB	100	19*13*2.5mm	Stamp hole	Serial port	Standard product, small size
E103-W05A	W600	PCB	130	24.7*14.4*11.2mm	DPI	Serial port	DPI module without shielding cover
E103-W05B	W600	IPEX	400(3dBi+omnidirectional)	17*16*2.5mm	Stamp hole	Serial port	External antenna, long distance
E103-W05C	W600	PCB	150	24*16*2.5mm	Stamp hole	Serial port	Same package as E103-W01

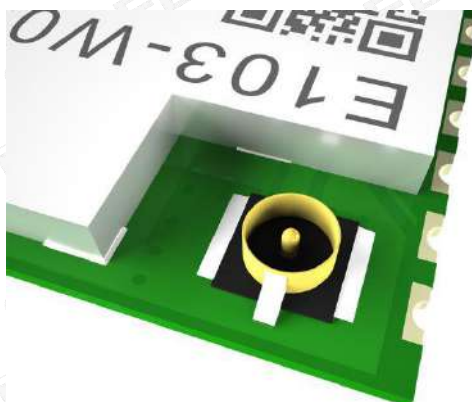
Chapter 10 Antenna Guide

9.1 Recommendation of Antenna

Antennas are an important role in the communication process, and often inferior antennas will have a great impact on the communication system. Therefore, our company recommends some antennas as supporting our company's wireless modules with excellent performance and reasonable prices.

Model No.	Type	Frequency	Gain	Size	Feeder	Interface	Feature
		Hz	dBi	mm	cm		
TX2400-NP-5010	Flexible Antenna	2.4G	2.0	10x50	-	IPEX	Flexible FPC soft antenna
TX2400-JZ-3	Rubber antenna	2.4G	2.0	30	-	SMA-J	Ultra-short straight, omnidirectional antenna
TX2400-JZ-5	Rubber antenna	2.4G	2.0	50	-	SMA-J	Ultra-short straight, omnidirectional antenna
TX2400-JW-5	Rubber antenna	2.4G	2.0	50	-	SMA-J	Fixed bending, omnidirectional antenna
TX2400-JK-11	Rubber antenna	2.4G	2.5	110	-	SMA-J	Bendable glue stick, omnidirectional antenna
TX2400-JK-20	Rubber antenna	2.4G	3.0	200	-	SMA-J	Bendable glue stick, omnidirectional antenna
TX2400-XPL-150	Sucker antenna	2.4G	3.5	150	150	SMA-J	Small suction cup antenna, cost-effective

9.2 Antenna selection



Enable IPEX antenna interface

Revision history

Version	Date	Description	Issued by
1.0	2020-6-18	Initial version	Roy
1.1	2020-7-14	Format revision	Li

About us

Technical support: support@cdebyte.com

Documents and RF Setting download link: www.ebyte.com

Thank you for using Ebyte products! Please contact us with any questions or suggestions: info@cdebyte.com

Official hotline: 028-61399028 ext. 821 Web: www.ebyte.com

Address: B5 Mould Park, 199# Xiqu Ave, High-tech District, Sichuan, China.



Chengdu Ebyte Electronic Technology Co.,Ltd.